**Robbins, Jan**
**From:** Foss, Dyan
**Sent:** Thursday, May 08, 2003 7 58 AM
**To:** Robbins, Jan
**Subject:** FW 776 DOP Modification for Public Comment

Jan, the attached is for the B776 DOP administrative record Thank you

**Dyan Foss**
303-966-7577 mobile 303-994-0325

***Kites rise highest against the wind***

-----Original Message-----

| | |
|---|---|
| **From** | Foss, Dyan |
| **Sent** | Wednesday, May 07, 2003 2 45 PM |
| **To** | 'Albert Nelson (E-mail)', 'Clark Johnson (E-mail)', 'Melissa Anderson (E-mail)', 'Patricia Rice (E-mail)', 'Shirley Garcia (E-mail)', 'jerryh@rfcab org' |
| **Cc** | Gunderson, Steve, 'Steve Tarlton (E-mail)', Kray, Edd, Schneider, John, Prymak, William, Schuetz, Gary, DiSalvo, Richard, Ferri, Mark, Hopkins, Ted, Corsi, John, Gerdeman, Fred, Rehder, Timothy, Wilson, Liz |
| **Subject** | 776 DOP Modification for Public Comment |

Attached is the Building 776/777 Decommissioning Operations Plan, Appendix I for demolition activities

A newspaper notification will be present in the May 12 editions, which will initiate the formal public comment period Public comment will be from May 12, 2003 and complete on June 11, 2003

I have attached two versions A clean version and version that has the new text highlighted By new, I mean text added since the April 15 version I appreciate everyone's time and comments during the informal comment period As you can see by the highlighted version, quite a bit of new text was included Although I know that the Appendix will require revision after the formal public comment period and there are still issues to work out, I think it's a better document due to the informal consultation and revision

The 776 DOP Appendix is on the agenda for the May 20th ER/D&D Meeting, and I will be there to answer any questions you may have at that time, but feel free to contact me before or after the 20th Again, thanks for the informal review!

**B776 DOP App I pdf**

**Dyan Foss**
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***Kites rise highest against the wind***

**APPENDIX I**
# Demolition Plan





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## 1.0 Introduction

The Rocky Flats Cleanup Agreement (RFCA) definition of decommissioning includes facility component removal, size reduction, decontamination, and demolition This appendix to the Building 776/777 Decommissioning Operations Plan (DOP) includes details for building demolition, which were not available at the time the DOP was prepared This demolition plan is being appended to the DOP through a major modification as required in the original DOP (Revision 0) which was approved on November 3, 1999 A minor modification to the original DOP is being prepared concurrently with this Appendix to ensure consistency within the document

This demolition plan describes the selected demolition method and characterization surveys that will be conducted, and describes demolition techniques and controls The goal of Building 776/777 decommissioning is to safely demolish and remove building components and structures to at least three feet below final grade and package and transport the debris to an approved disposal facility The characterization and remediation of the soil and groundwater beneath the facility is not within the scope of this DOP Building 776/777 Project Management will coordinate with Environmental Restoration (ER) when making decisions on leaving below-grade structures or components in place

### 1 1 Demolition Objectives and ALARA

The absolute goal of the 776/777 demolition project is to maintain releases to the environment and doses to the workers as low as reasonably achievable (ALARA) Before demolition, selected contaminated areas will be removed, and others will be hydrolased During demolition, the ALARA goals will be accomplished by the usage of a combination of reasonable decontamination techniques including component removal, fixation and/or encapsulation of remaining contamination, and demolition techniques designed to minimize releases of any residual contamination Basic techniques for these processes are described under Section 5 0 The overall demolition objectives for Building 776/777 are to

- Protect the environment,
- Protect the public to the extent practical by maintaining emissions as low as reasonably achievable,
- Protect worker health and safety,
- Package the majority of the building as waste for disposal at off-site facilities (e g , Nevada Test Site, Hanford, Envirocare),
- Remove building components to at least three feet below final grade, and
- Accommodate future land-use as a national wildlife refuge

### 1.2 Overall Process

The decommissioning process for Building 776/777 will involve decontamination, removals, and application of controls inside the building before demolition and application of controls outside the building during demolition The current Building 776/777 DOP (Revision 0) covers the decontamination, removals, and application of controls inside the building before demolition This Appendix to the DOP specifically addresses the demolition Since the proposed demolition method relies on the preparation of the facility before demolition as a control, this appendix addresses the overall methodology While the building is being prepared for demolition, evaluations will be made to ensure that the goals and objectives stated in this appendix to the DOP are maintained These evaluations will be based on what is removed from the building before demolition, what will remain in the building during demolition, and the nature and extent of contamination of the building before demolition

Facility demolition will involve the use of large mechanical equipment, which may include excavators equipped with a hydraulic hoe-ram and grapple, hoists and cranes, and front-end loaders These will be



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used to size reduce, segregate, and load the concrete, steel and other facility materials into waste containers, with enhanced controls for radiological protection The following is a simplified outline of the proposed Building 776/777 decommissioning process

1 Facility decontamination and component removal (risk reduction) are initiated with concurrent in-process characterization (addressed in Sections 1 2, 3 0, and 4 0)
    - Decisions are made throughout the facility to decontaminate, fix, or remove contamination and/or contaminated components
2 Resource Conservation and Recovery Act (RCRA) units are closed
3 Chemicals and hazardous substances are removed
4 Beryllium regulated and controlled areas are closed
5 Polychlorinated biphenyls (PCB) hazards and equipment are removed
6 Asbestos is abated
7 The final characterization is conducted (addressed in Section 4 2)
8 Areas with contamination or with potential contamination are fixed and encapsulated (addressed in Section 3 0 and 4 2)
9 The *Final Characterization Report* is prepared, reviewed, and concurred to by the Lead Regulatory Agency (LRA) (addressed in Section 4 2)
10 The Contractor Demolition Plan and work packages for demolition are prepared and reviewed (addressed in Section 5 1)
11 Demolition is completed (addressed in Section 5 2)
12 Final project closeout reports and documentation are prepared, reviewed and approved by the LRA (addressed in Section 4 18 4 of the original DOP (Revision 0))
13 Remediation activities (soil and groundwater) are initiated, as necessary (addressed in Section 7 0 and other RFCA decision documents)

Although this process is laid out in a sequential manner, many of the activities overlap For instance, characterization may be conducted in rooms adjacent to decontamination activities All of 13 steps/processes described will have the opportunity for information exchanges and participation with DOE, Kaiser-Hill and its subcontractors, the regulatory agencies, and the public

### 1 3 Public Involvement

Approval of this major modification to the DOP is the first step in the public involvement process for the Building 776/777 Project It is anticipated that there will be continued public interest in the progress of the decommissioning activity. There will be numerous opportunities for standard information exchanges potentially including the following

- ER/D&D Monthly Status Meeting – Status of the facility preparation for demolition, characterization and demolition activity
- Rocky Flats Coalition of Local Governments Monthly Meeting – Presentations and information exchanges as requested
- Rocky Flats Citizens Advisory Board Monthly Meetings – Presentations and information exchanges as requested

At a minimum, it is anticipated that presentations and information exchanges will occur before the finalization of characterization plan, finalization of the characterization report, and demolition initiation

## 2.0 Screening of Alternatives

This evaluation applies RFCA's criteria in evaluating alternatives for demolishing Building 776/777 Four alternatives for the demolition of Building 776/777 were evaluated, which are

Alternative 1 Complete decontamination to unrestricted release levels followed by demolition
Alternative 2 Demolition inside a full containment structure



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Alternative 3 Mechanical/selective demolition with local containment
Alternative 4 Decontamination followed by demolition

In accordance with the RFCA Implementation Guidance Document (IGD), the selected alternatives were evaluated for effectiveness, implementability, and cost If the alternatives pass the initial screening based on effectiveness, implementability, and cost, then alternatives will be compared on a qualitative basis using descriptors such as high, medium, or low

### 2 1 Alternative 1· Complete decontamination to free releasable standards followed by demolition

This alternative assumes that decontamination efforts would result in a facility that meets the unrestricted release criteria In this alternative, decontamination technologies (hydrolasing, scabbling, scarification, etc ) that remove the outermost layers of concrete, steel, and other construction materials would be used to result in a surface that meets unrestricted release levels Portions of the building that could not be decontaminated to free release criteria would be removed, such as the original roof, the second floor, and portions of the first floor Following decontamination, radiological surveys would be performed to verify that the remaining materials would meet unrestricted release criteria The released structure could then be demolished, and the concrete would be managed per the RFCA Standard Operating Protocol (RSOP) for Recycling Concrete The released concrete portion of the building would be reused as fill on-site as demolition debris The remaining building debris would be disposed of at an off-site facility

#### 2 1 1 Effectiveness

Effectiveness considers whether the alternative provides protection of public health and the environment Bringing the facility to unrestricted release levels before demolition reduces the overall potential for the release of contamination to the environment This alternative has no short-term adverse impacts to public health and the environment, and complies with the applicable or relevant and appropriate requirements (ARARs) However, this alternative has significant potential short-term adverse impacts to the workers implementing the action, due to the extended schedule requiring additional exposure to radiological and industrial hazards and the potential for partial building collapse Long-term effectiveness is not relevant because the demolition activity is short-term, and once the building has been removed, the risk has been removed

#### 2 1 2 Implementability

Implementability addresses the technical and administrative feasibility of implementing an alternative and the availability of the services and materials required

**Technical Feasibility**

This alternative carries the potential of partial building collapse due to the possibility that structural supports will be required as decontamination efforts erode the building's structural integrity In addition, decontamination to the unrestricted release levels is not feasible, based on the following information

Building 776/777's cinder block construction accounts for approximately 40% of the building exterior walls Subject matter experts believe that plutonium-laden smoke penetrated these blocks during the 1969 fire, rendering complete decontamination technically unattainable The porous nature of this material would require scabbling or hydrolasing to remove the contaminants Work to-date indicates that the smoke did contaminate conduit and pipe penetrations in the block walls Decontamination activities would render the walls structurally unstable with a high risk of collapse Similarly, plutonium impregnated smoke is expected to



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have penetrated into steel joints, footer joints, sheet metal overlaps on the original roof, and virtually all other cracks or crevices in the areas that held smoke or water in May 1969

In 1969, fire recovery efforts included encasing a portion of the building's structural steel beam columns in envelopes of concrete This concrete was intended to provide additional structural support for steel weakened from the heat of the fire Joints and base plates for metal columns throughout the building expanded with heat and may have allowed contamination from smoke and water under the plates/joints When the metal beams cooled, the contamination was trapped Removing the steel columns would render the building structurally unsound

Cracks and penetrations within the walls of the building and ceiling were contaminated with firewater and smoke For approximately two years after the 1969 fire, decontamination operations were conducted within the building with a cleanup target of 5,000 dpm/100 $cm^2$ removable and the fixed contamination was not given an upper limit This exhaustive effort removed, at least in some areas, more than 99% of the contamination from the fire Interviews with management personnel involved in the effort indicated that contamination removal activities ceased only when additional work did not result in additional decontamination After two years, many contaminated areas exceeded this limit and were fixed with epoxy and paint

Some areas within the Building 776/777 complex were filled with concrete after the 1969 fire in an effort to fix the contamination Decontamination within the concrete cannot be successfully completed given that the contamination is now trapped inside concrete layers

The post-fire decontamination effort was conducted to the existing radiological exposure and safety standards current at the time Rocky Flats Environmental Technology Site (RFETS or Site) records indicate that decontamination personnel experienced radiological uptakes and some still carry plutonium body burdens dating from these activities Additional decontamination efforts would be conducted to more modern exposure and safety standards, but a large-scale decontamination effort carries risk of exposures that are not necessary if safer demolition alternatives with a lower worker exposure risk are available

No unique permits would be required for this alternative This alternative is protective of the environment as all decontamination and demolition activities would be conducted under full containment, reducing the likelihood of a release to the environment

## Availability of Services and Materials

Equipment for decontamination, surveys, and structural support would be required for this alternative It is uncertain whether technology and/or equipment exist to decontaminate cinder block walls that cannot be removed before demolition Personnel and services, monitoring, and outside laboratory testing may be required in the short- and long-term to address any increased monitoring that may be required ER would address post-removal site control, as necessary

## Administrative Feasibility

This alternative is administratively feasible because there is no need for coordination with other offices or agencies for permits, easements for rights-of way, or zoning variances There may be an impact to adjoining property if contamination were to migrate offsite Under this alternative, existing Site management and access controls would be maintained until the demolition was complete This alternative would be acceptable to the State and/or local communities



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### 2.1.3 Costs

Evaluation of costs should consider the capital costs to engineer, procure, and construct the required equipment and facilities, and the operating and maintenance costs associated with the alternative In accordance with the IGD, cost estimates can be "order-of-magnitude" with sufficient accuracy to allow comparison and ranking of the alternatives

**Capital Cost**

Alternative 1 is estimated to cost approximately $41,500,000

**Operation and Maintenance**

There are no operations and maintenance costs associated with this alternative

**Present Worth Cost**

This analysis was not completed, it is assumed that the alternative would be implemented fairly soon, therefore, today's dollars are a fair estimate

## 2.2 Alternative 2: Demolition inside a full containment structure

Building 776/777 and a portion of the Building 779 pad would be enclosed inside a steel structure, either fabric covered or hard-sided. The structure's approximate dimensions would be 400 feet wide by 800 feet long by 100 feet tall The containment size is designed to allow conventional demolition equipment to operate without significant restrictions The structure would be designed to withstand winds between 90 miles per hour and 125 miles per hour, and be effectively sealed and negatively ventilated Installation would require building a rail system to support assembly of the frame in sections over the Building 779 pad These sections would then be rolled into position over Building 776/777 to avoid heavy lifts over the building during ongoing decommissioning of the interior

Operating equipment within the structure would be powered by propane, requiring that the ventilation system be sized to support sufficient air changes to prevent accumulations of unacceptable levels of airborne exhaust

Activities inside the containment would include localized decontamination coupled with demolition Packages of contaminated building debris would exit the containment at the 779 pad

### 2.2.1 Effectiveness

Effectiveness considers whether the alternative provides protection of public health and the environment This alternative has no short-term adverse impacts to public health and the environment, and complies with the ARARs However, this alternative has significant potential short-term adverse impacts to the workers implementing the action because this alternative involves assembly and disassembly of a 400 feet wide by 800 feet long by 100 feet tall containment The amount and type of construction activities involved in erecting and disassembly of a free span structure of this size is significant Any project of this magnitude involves an added risk to the workers from an occupational accident Construction related accidents during erection and disassembly could result in significant or fatal accidents affecting a number of personnel The schedule impacts associated with this approach proportionately increases the risk due to the longer duration and potential for additional injuries Long-term effectiveness is not relevant because the demolition activity is short-term and once the building has been removed, the risk has been removed

### 2.2.2 Implementability

Implementability addresses the technical and administrative feasibility of implementing an alternative and the availability of the services and materials required

**Technical Feasibility**

This alternative involves assembly and disassembly of a 400 feet wide by 800 feet long by 100 feet tall containment The amount and type of construction activities involved in the erection and disassembly of a free span structure of this size is significant In addition to its size, the structure would have to be constructed to withstand significant winds and snow loads A structure of this size has never been constructed, and may not be feasible

No unique permits would be required for this alternative This alternative would be adaptable to environmental conditions because all work would be conducted within a tent designed to withstand the environment

**Availability of Services and Materials**

Equipment for decontamination, surveys, structural support, and tent construction would be required for this alternative A structure this size, designed for containment, has never been constructed over an active facility, the technology is unproven Personnel and services, monitoring, and outside laboratory testing may be required in the short- and long-term to address any increased monitoring that may be required ER would address post-removal site control, as necessary

**Administrative Feasibility**

This alternative is administratively feasible because there is no need for coordination with other offices or agencies for permits, easements for rights-of way, or zoning variances There may be an impact to adjoining property if contamination were to migrate offsite Under this alternative, existing Site management and access controls would be maintained until the demolition was complete This alternative would be acceptable to the State and/or local communities

### 2.2.3 Costs

Evaluation of costs should consider the capital costs to engineer, procure, and construct the required equipment and facilities, and the operating and maintenance costs associated with the alternative In accordance with the IGD, cost estimates can be "order-of-magnitude" with sufficient accuracy to allow comparison and ranking of the alternatives

**Capital Cost**

Alternative 2 is estimated to cost approximately $48,600,000

**Operation and Maintenance**

There are no operations and maintenance costs associated with this alternative

**Present Worth Cost**

This analysis was not completed, it is assumed that the alternative would be implemented fairly soon, therefore, today's dollars are a fair estimate

## 2.3 Alternative 3: Mechanical/selective demolition with local containment

The selective demolition alternative would require a piece-by-piece decontamination and demolition of the building under either the radiological controls that currently exist within the building, or alternatively under new controls constructed to maintain comparable integrity Each area could require localized containment to maintain negative ventilation Selective demolition requires a combination of techniques, to include at a minimum

- All exterior walls would be removed using a specially constructed rolling scaffold designed to maintain negative ventilation This would involve moving the rolling scaffold and establishing seals to support negative ventilation at each location All the exterior walls would need to be replaced with a fire rated panel, so that building integrity would be maintained during subsequent demolition of the interior The moving scaffold would need to be designed to support removal of 32-foot block walls that may be subject to collapse during removal
- Concurrently, the interior walls could be removed with the building intact and airflow controlled by building ventilation
- Temporary ventilation would need to be installed to maintain negative ventilation while the remaining air exhaust ducts and plenums are removed
- The original roof would be removed from the second floor using scaffolding
- After removal of the original roof, the second floor could be removed from the first floor using scaffolding
- Next, the building floor slab would be removed with the building still intact and ventilated by the existing air plenums
- Once the interior of the building has been gutted and only the skeleton of the building and roof remain, then the replacement exterior panels could be removed
- The building shell and steel superstructure would be removed in small sections inside of a movable partial containment with temporary ventilation
- The building footings, pipe, and concrete would be removed to 3 feet below grade inside the movable partial containment

Structural analysis would be required for all of these steps to assure that the remaining structure is not subject to collapse, and that the building could maintain a sufficiently negative air pressure It is probable that additional structural elements (such as buttresses to hold up the building frame) would be required to maintain building integrity while crews concurrently dismantle the building Removal of the ceiling and the second floor would require numerous lift plans and careful engineering to ensure worker safety

### 2.3.1 Effectiveness

Effectiveness considers whether the alternative provides protection of public health and the environment This alternative has no short-term adverse impacts to public health and the environment, and complies with the ARARs However, this alternative has significant potential short-term adverse impacts to the workers implementing the action because this alternative is labor intensive with high worker risk due to elevated work activities, more "hands on" activities versus use of heavy equipment, and increased potential for dose to workers Assembling and dismantling rolling scaffold and building additional containment's increases worker industrial and radiological risk Removal of the interior structural elements could degrade the structural integrity of portions of the remaining facility possibly causing unplanned collapses

### 2.3.2 Implementability

Implementability addresses the technical and administrative feasibility of implementing an alternative and the availability of the services and materials required



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**Technical Feasibility**

The piece-by-piece disassembly of a facility this size under localized containment has not been demonstrated Structural evaluations would be required throughout this alternative, however, accurate evaluations are probably not possible, due to the history of the facility and because many of the structural elements cannot be accessed without destruction

No unique permits would be required for this alternative This alternative would be adaptable to environmental conditions because all work would be conducted within containment designed to withstand the environment

**Availability of Services and Materials**

Equipment for decontamination, surveys, structural support, and localized tent construction would be required for this alternative Personnel and services, monitoring, and outside laboratory testing may be required in the short- and long-term to address any increased monitoring that may be required ER would address post-removal site control, as necessary

**Administrative Feasibility**

This alternative is administratively feasible because there is no need for coordination with other offices or agencies for permits, easements for rights-of way, or zoning variances There may be an impact to adjoining property if contamination were to migrate offsite Under this alternative, existing Site management and access controls would be maintained until the demolition was complete This alternative would be acceptable to the State and/or local communities

### 2.3.3 Costs

Evaluation of costs should consider the capital costs to engineer, procure, and construct the required equipment and facilities, and the operating and maintenance costs associated with the alternative In accordance with the IGD, cost estimates can be "order-of-magnitude" with sufficient accuracy to allow comparison and ranking of the alternatives

**Capital Cost**

Alternative 3 is estimated to cost approximately $45,700,000

**Operation and Maintenance**

There are no operations and maintenance costs associated with this alternative

**Present Worth Cost**

This analysis was not completed, it is assumed that the alternative would be implemented fairly soon, therefore, today's dollars are a fair estimate

## 2.4 Alternative 4: Decontamination followed by demolition

Alternative 4 would involve decontamination, removals, and application of controls inside the building before demolition and application of controls outside the building during demolition While the building is being prepared for demolition, evaluations will be made to ensure that the remaining contamination can be controlled during the demolition These evaluations will be based on what is removed from the building before demolition, what will remain in the building during demolition, and the nature and extent of contamination of the building before demolition



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Contamination would be identified through radiological surveys of the accessible areas of the building surfaces using a sodium iodide or similar detector Hard to characterize areas would be investigated using a variety of measurement and sampling techniques Identified areas will be decontaminated, fixed, or engineering controls applied so that subsequent demolition has minimal risk of radiological releases Final scan results would be compiled in a project-specific characterization report that will be submitted to Colorado Department of Public Health and Environment (CDPHE)

Once contamination has been removed or fixed, facility demolition will involve the use of large mechanical equipment, which may include excavators equipped with a hydraulic hoe-ram and grapple, hoists and cranes, and front-end loaders These will be used to size reduce, segregate, and load the concrete, steel and other facility materials into waste containers, with enhanced controls for radiological protection Radiological monitoring to demonstrate protection of workers, co-located workers, and the public would be utilized The concrete slab would be removed and loaded in waste containers using an excavator after the upper portion of the structure has been dispositioned Engineering and administrative controls would be used during demolition of the building reduce the spread of contamination These controls include but are not limited to

- Dust suppression alternatives, such as water spray, to ensure the demolition area is wet,
- If contamination is present in an inaccessible area before removal, additional controls may be used such as encapsulation or selective removal

In addition, all building waste would be shipped to off-site facilities, none would be used on-site as backfill

### 2.4.1 Effectiveness

Effectiveness considers whether the alternative provides protection of public health and the environment Evaluating the radiological risk to the public from implementing this alternative establishes that dose levels to the public are well within established limits and no gain is realized to the public health from the other alternatives

### 2.4.2 Implementability

Implementability addresses the technical and administrative feasibility of implementing an alternative and the availability of the services and materials required

#### Technical Feasibility

The techniques required for this alternative are standard and proven techniques for demolition The demolition approach is consistent with commercial nuclear standards and to a lesser extent some specific government practices This technique has been proven to be safe and effective

No unique permits would be required for this alternative This alternative would require specific controls to address changes in environmental conditions

#### Availability of Services and Materials

Equipment for decontamination and surveys would be required for this alternative Personnel and services, monitoring, and outside laboratory testing may be required in the short- and long-term to address any increased monitoring that may be required ER would address post-removal site control, as necessary

**Administrative Feasibility**

This alternative is administratively feasible because there is no need for coordination with other offices or agencies for permits, easements for rights-of way, or zoning variances There may be an impact to adjoining property if contamination were to migrate offsite Under this alternative, existing Site management and access controls would be maintained until the demolition was complete This alternative would be acceptable to the State and/or local communities, however, it is anticipated that supplementary consultation would be required

### 2.4.3 Costs

Evaluation of costs should consider the capital costs to engineer, procure, and construct the required equipment and facilities, and the operating and maintenance costs associated with the alternative In accordance with the IGD, cost estimates can be "order-of-magnitude" with sufficient accuracy to allow comparison and ranking of the alternatives

**Capital Cost**

Alternative 4 is estimated to cost approximately $15,500,000

**Operation and Maintenance**

There are no operations and maintenance costs associated with this alternative

**Present Worth Cost**

This analysis was not completed, it is assumed that the alternative would also be implemented fairly soon, therefore, today's dollars are a fair estimate

### 2.5 Comparative Analysis of Alternatives

As indicated by the IGD, only alternatives passing the initial screening based on effectiveness, implementability, and cost are compared against each other Only one alternative passed the initial screen, Alternative 4 Alternatives 1 through 3 are not technically feasible, primarily due to the history of the building

Table I-1 presents a comparative analysis of alternatives made on a semiquantitative ranking system based on effectiveness, implementability, and cost Each category has been scored low (L), medium (M), or high (H) A low score means that the criteria cannot be achieved, a medium score means that the criteria can be achieved most of the time, and a high score means that the criteria will always be achieved or is not required under the alternative

Decontamination followed by demolition provides the optimum benefits for on-site workers while providing protection to both the environment and off-site receptors This alternative is the only alternative that is consistent with all of the goals established in the RFCA to

- Reduce the residual radiation and to do so by an approach that minimizes the amount of waste generated,
- Minimize the risk potentially associated with radiological exposure, and
- Balance radiological exposures against economic and social factors producing a positive net benefit to the worker, public, and the environment

Alternative 4 has been selected as the alternative that provides the optimum benefits for on-site workers, while still providing regulatory compliant protection off-site for human health and the environment

## Table I-1
## Comparative Analysis of Alternatives

| Screening Criteria | Alternative 1 Complete decontamination to unrestricted release levels followed by demolition | Alternative 2 Demolition inside a full containment structure | Alternative 3 Mechanical/selective demolition with local containment | Alternative 4 Decontamination followed by demolition |
|---|---|---|---|---|
| **Effectiveness**[1] | | | | |
| ***Protectiveness*** | | | | |
| Public health | H | H | H | H |
| Workers | L | L | L | H |
| Environment | H | H | H | H |
| Attains ARARs | H | H | H | H |
| **Implementability** | | | | |
| ***Technical Feasibility*** | | | | |
| Construction and operation | M | L | L | H |
| Demonstrated performance | L | L | L | H |
| Adaptable to environmental conditions | M | L | M | M |
| Need for permits | H | H | H | H |
| ***Availability of Services and Materials*** | | | | |
| Equipment | M | L | L | H |
| Personnel and services | M | L | M | H |
| Outside laboratory testing | H | H | H | H |
| Offsite treatment and disposal | H | H | H | H |
| Post-removal site control | H | H | H | H |

[1] Each category has been scored low (L), medium (M), or high (H) A low score means that the criteria cannot be achieved, a medium score means that the criteria can be achieved most of the time, and a high score means that the criteria will always be achieved or is not required under the alternative

| Screening Criteria | Alternative 1 Complete decontamination to unrestricted release levels followed by demolition | Alternative 2 Demolition inside a full containment structure | Alternative 3 Mechanical/selective demolition with local containment | Alternative 4 Decontamination followed by demolition |
|---|---|---|---|---|
| **Implementability** | | | | |
| ***Administrative Feasibility*** | | | | |
| Permits required | H | H | H | H |
| Easements for rights-of-way required | H | H | H | H |
| Impact on adjoining property | H | H | H | H |
| Ability to impose institutional controls | H | H | H | H |
| Acceptable to State and local communities | H | H | H | M |
| **Costs**[2] | | | | |
| Capital cost | L | L | L | H |
| Operation and maintenance | H | H | H | H |
| Present worth cost | H | H | H | H |

[2] Each category has been scored low (L), medium (M), or high (H) A low score means that the criteria cannot be achieved, a medium score means that the criteria can be achieved most of the time, and a high score means that the criteria will always be achieved or is not required under the alternative

## 3.0 Pre-Demolition Activities and Methods

Building 776/777 is different from other plutonium buildings at the Site for several reasons The building has structural steel framing with perimeter transite panels and cinder block walls, instead of only poured-in-place concrete The foundation has former basements and equipment pits up to 25 feet deep, filled with solid concrete Finally, the 1969 fire caused extensive damage that resulted in contamination throughout the building from the fire, smoke, and water All of these factors make decontamination to the unrestricted release levels impractical Therefore, a general approach has been developed and will be refined to include decontamination followed by demolishing the structure and packaging and shipping the debris as low level waste

This decommissioning process will involve decontamination, removals, and application of controls inside the building before demolition and application of controls outside the building during demolition The current Building 776/777 DOP covers the decontamination, removals, and application of controls inside the building prior to demolition, however, the general process will be documented within this appendix to the DOP for completeness

Before demolition, RCRA units will be closed, asbestos will be abated, and chemicals and hazardous constituents will be removed Transuranic (TRU) waste, gloveboxes, and contaminated process waste piping will be removed Non-process piping, ducting, and other equipment left within the facility at the time of demolition will be assessed and the information documented in the project specific final characterization report Examples include fire suppression piping, plant steam and water lines, and nitrogen and plant air lines

To date, preliminary characterization of the building has been conducted for work planning purposes As work planning continues, additional in-process characterization will be performed, and work packages will be prepared to address the activities that must be conducted before the demolition The purpose of these characterization efforts is to demonstrate the extent and magnitude of the existing radiological contamination, before demolition of the building Alternatively, due to the technical limitations of decontaminating or removing some of the facility's inaccessible locations, additional radiological controls will be applied, as appropriate, to limit the release of contamination from these areas during demolition The decision for each of these particular actions will be based on the following

- Levels and types of contamination,
- Extent of the contaminated areas,
- Material the contamination is on (e g , cinderblock vs concrete),
- Ability to control contamination during demolition and waste handling,
- Potential for releases to the environment,
- Structural consequences, and
- Industrial safety risk, worker exposure, and cost associated with removing, decontaminating, and/or fixing the contamination

A variety of decontamination methods have been evaluated, including hydrolasing, pressure washing, scabbling, and concrete shaving The method or methods used will be selected based on the above criteria

Table I-2 documents the potential pre-demolition methodology and how the decisions may be made to implement those actions and controls This table is not all-inclusive The final decision-making will be made at the project level and documented in the work packages CDPHE will have the opportunity to participate in work package review per the consultative process outlined in RFCA and in Section 11 of the DOP



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In balancing the worker safety, environmental and human health protection, and cost/schedule, it is currently conceived that removal and the use of fixatives and encapsulants will generally be conducted as follows, however, specific decisions will be made on a case-by-case basis

- Floors with high to medium contamination will be decontaminated
- Floor with low contamination will not be decontaminated and fixatives and encapsulants will be applied
- Ceilings with high contamination will be decontaminated or removed
- Ceilings with medium to low contamination will not be decontaminated and fixatives and encapsulants will be applied
- The upper half of walls with high contamination will be decontaminated or removed
- The upper half of walls with medium to low contamination will be encapsulated
- The lower half of walls with high to medium contamination will be decontaminated or encapsulated
- The lower half of walls with low contamination will be encapsulated

The list above is as an example of the general decision-making given the current characterization information The initial air modeling indicates the project will be protective of the environment and public health Consequently, the decision-making will be primarily based on the risks to the workers, and can generally be simplified into the following single rule

**If**

Risks (industrial and radiological) to the workers are greater than the benefit in source term reduction

**And**

Controls can be applied to reduce emissions,

**Then**

The work (decontamination and/or removal) will not be conducted

**And**

Controls will be applied before and/or during demolition

## Table I-2
## Pre-Demolition Methodology

| Pre-demolition Method | | Potential Decision Criteria | |
|---|---|---|---|
| | | If | Then |
| Walls | Decontaminate | Decontamination could affect the structural integrity of the wall | Decontamination is not an alternative |
| | | Contamination is removable | Consider decontamination if it reduces worker exposure during subsequent activities |
| | | Decontamination will be effective at removing the majority of the surface contamination with one pass | Evaluate the worker risk and cost associated with conducting the decontamination |
| | Remove – cut out | The wall is structural or potentially structural | Removal is not an alternative |
| | Apply fixative and encapsulants | Removal and decontamination are not selected | Survey the area in accordance with the approved survey plan and apply fixatives and encapsulants, as appropriate |
| | Delineate the area with paint | The contamination level requires additional controls[3] during the demolition activity | Mark the area so it can be readily identified during demolition |
| Floors | Decontaminate | Contamination is removable | Consider decontamination if it reduces worker exposure during subsequent activities |
| | | Decontamination will be effective at removing the majority of the surface contamination with one pass | Evaluate the worker risk and cost associated with conducting the decontamination |
| | Remove – cut out | The slab thickness is conducive to cutting | Evaluate the worker risk and cost associated with conducting the slab removal |
| | Apply fixative and encapsulants | Removal and decontamination are not selected | Survey the area in accordance with the approved survey plan and apply fixatives and encapsulants, as appropriate |
| | Delineate the area with paint | The contamination level requires additional controls[1] during the demolition activity | Mark the area so it can be readily identified during demolition |

[3] Beyond the controls that will be applied through the demolition process For example, additional controls could be reduced wind speed, additional dust control (i e , amended water), and/or immediate containerization

| | Potential Actions and Controls | Potential Decision Criteria | |
|---|---|---|---|
| | | If | Then |
| Ceiling | Decontaminate | Contamination is removable | Consider decontamination if it reduces worker exposure during subsequent activities |
| | | Decontamination will be effective at removing the majority of the surface contamination with one pass | Evaluate the worker risk and cost associated with conducting the decontamination |
| | Remove – cut out | Contamination is localized and accessible | Evaluate the worker risk and cost associated with conducting the ceiling removal |
| | Apply fixative and encapsulants | Removal and decontamination are not selected | Survey the area in accordance with the approved survey plan and apply fixatives and encapsulants, as appropriate |
| | Delineate the area with paint | The contamination level requires additional controls[1] during the demolition activity | Mark the area so it can be readily identified during demolition |
| Columns/ Joints | Apply fixative and encapsulants | Removal and decontamination are not a viable alternative | Survey the area in accordance with the approved survey plan and apply fixatives and encapsulants, as appropriate |
| | Decontaminate | Contamination is removable | Consider decontamination if it reduces worker exposure during subsequent activities |
| | Delineate the area with paint | The contamination level requires additional controls[1] during the demolition activity | Mark the area so it can be readily identified during demolition |

[1] Beyond the controls that will be applied through the demolition process For example, additional controls could be reduced wind speed, additional dust control (i e , amended water), and/or immediate containerization

## 4.0 Pre-Demolition Evaluation

While the building is being prepared for demolition, evaluations will be made to ensure that the goals and objectives stated in this appendix to the DOP are maintained These evaluations will be based on what is removed from the building before demolition, what will remain in the building during demolition, and the nature and extent of contamination of the building before demolition This section outlines that evaluation process, the regulatory basis for evaluation, and the characterization approach

### 4 1 Regulatory Framework and Assessment

The applicable regulatory requirements from the *National Emission Standards for Emissions of Radionuclides Other than Radon from Department of Energy Facilities* are

- 40 CFR § 61 92, which states that emissions of radionuclides to the ambient air from US Department of Energy (DOE) facilities shall not exceed those amounts that would cause any member of the public to receive in any year an effective dose equivalent of 10 millirem per year (mrem/yr), and
- 40 CFR § 61 93(b)(4), which states radionuclide emission measurements shall be made at all release points which have a potential to discharge radionuclides into the air which could cause an effective dose equivalent in excess of 1% of the 10 mrem standard (0 1 mrem) to any member of the public

The relevant and appropriate regulatory requirements from the *Colorado Radiation Control Division of Laboratory & Radiation Services* are

- RH 4 5 2, which states that to the extent practical, procedures and engineering controls based on sound radiation protection principles should be used to achieve doses to members of the public that are as low as reasonably achievable, and
- RH 4 5 4, which states that a constraint on air emissions shall be established such that the individual member of the public likely to receive the highest dose will not be expected to receive a total effective dose equivalent in excess of 0 1 millisievert per year (equivalent to 10 mrem/yr) from these emissions

Since Building 776/777 is part of a much larger closure project, a project-specific emissions objective of 0 1 mrem project contribution has been established for the Building 776/777 demolition The emissions objective is based on the principle of maintaining the project emissions as low as reasonably achievable, and is the project's commitment to a 99% reduction of the allowable emissions to the closest public receptor The emissions objective has several components

- This is the regulatory criterion used to determine when radiological air monitoring is required,
- The actual measured average contamination remaining after decontamination is expected to be well below the level required to meet the 0 1 mrem emissions objective,
- The air modeling assumptions are very conservative, and
- Additional demolition controls will be used that are not credited in the air model (e g , dust suppression misting, use of fixatives, and controls on waste piles and container loading)

Compliance with this emissions objective will ensure the 0 1 mrem annual project contribution to the public is not exceeded

After the targeted decontamination and removals are complete, final characterization activities will be conducted to collect information to complete the following

- Model emissions that could result from the demolition activity to determine potential impacts to the immediate and co-located workers and the public,
- Finalize the work area controls required during the demolition, and



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- Verify that the waste acceptance criteria for the demolition debris are met

The success of the decontamination and removal activities will be determined by comparing the goals and objectives in this DOP appendix with the results of the air modeling After completion of decontamination and/or removal activities, the remaining contamination will be measured and the resultant building average will be modeled using an US Environmental Protection Agency (EPA)-approved air model (ISCST3) to derive the effective dose equivalent at the fenceline If the modeling indicates that a level of 0 1 mrem will be exceeded at the Site fenceline because of demolition of Building 776/777, additional decontamination and/or removal will be performed Engineering controls such as the application of fixatives and/or encapsulants will then be applied to areas with significant remaining contamination The air modeling results will be provided to the LRA as part of a project specific final characterization report

In addition to evaluating the impact of the demolition at the Site boundary, the modeling will be used to finalize the work area boundaries/controls and worker protection requirements during demolition The modeling will provide conservative estimates of the potential dose to the immediate and collocated worker and the potential deposition of contamination during demolition Based on these results, work area boundaries and personnel protection equipment will be established in the health and safety plan, radiological work permits (RWPs), and job hazard analysis Project area air sampling and personnel monitoring will be used to verify these protection factors/controls are effective Based on the results of this monitoring and the ambient conditions, the controls may be increased or decreased, as necessary throughout the demolition project

The pre-demolition characteristics of the soil surrounding the project will need to be assessed to ensure that the project contribution to soil contamination is as low as reasonably achievable Since the project is predominantly surrounded by paving, the surrounding area may be periodically sprayed and/or cleaned to ensure that particulate matter does not accumulate throughout the demolition project and become available for re-suspension by wind The preliminary assessment of the soils surrounding the project and the modeling projection of the potential soil deposition will be included in the project specific final characterization report, which will be provided to the LRA

### 4 2 Building 776/777 Project Specific Final Characterization

Following decontamination and/or removal efforts, a final characterization will be conducted, followed by air modeling to verify the 0 1 mrem maximum dose contribution from Building 776/777 demolition The survey will be conducted in accordance with a project-specific characterization plan, which will be submitted to the LRA for review and approval

The measurements that will be performed during final characterization will be total surface contamination The final characterization survey results will be included in a project specific characterization report and submitted to the LRA This process will confirm that decontamination activities (i e , decontaminate or remove) are complete, residual contamination will not result in a dose of greater than 0 1 mrem at the site boundary, and the facility is ready for application of fixatives followed by demolition

Non-radiological contaminants such as hazardous waste/substances, beryllium, PCBs, and asbestos will be characterized and/or removed before the final characterization is completed and will be managed in accordance with Industrial Hygiene and Waste Acceptance Criteria requirements Building characterization for non-radiological contaminants before demolition will be documented in the project-specific characterization report or other reports provided to the LRA, such as the asbestos clearance certification and demolition permit application



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Once the facility characterization is complete, fixatives and encapsulants will be applied throughout the facility Areas that will not be encapsulated will be those areas that meet the unrestricted release criteria For example, the offices, annex and potentially the vault area may not require encapsulants

## 5.0 Demolition Activities and Methods

Facility demolition will involve the use of large mechanical equipment, which may include excavators equipped with a hydraulic hoe-ram and grapple, hoists and cranes, and front-end loaders These will be used to size reduce, segregate, and load the concrete, steel and other facility materials into waste containers, with enhanced controls for radiological protection The primary demolition steps and mechanical techniques for dismantling, segmenting, and demolishing will be provided in activity-specific work package(s)

Excavator-mounted attachments are industry standard for a variety of demolition projects, and provide a controlled method to disassemble a structure Attachments include concrete pulverizers, shears, grapples, and rams Demolition methods that may be used on concrete floors and thick walls include abrasive cutters, diamond wire cutters, paving breakers (i e , jackhammers), and cracking agents

After facility components and structures have been disconnected and disassembled, they will be size reduced and packaged for disposal Removal of large items and sections of walls and flooring will be accomplished using mechanical lifting and hauling devices, such as hoists and cranes Such devices will be inspected and approved for the work, and operated by qualified operators Excavation work will be conducted in accordance with the Occupational Safety and Industrial Hygiene (OS&IH) Program Manual, which includes requirements for soil disturbance permits, if applicable, such as when excavating buried structures that contact soil

### 5 1 Demolition Planning and Execution

Demolition activities will be executed using the Site Integrated Work Control Process (IWCP) The work packages will contain the detailed work instructions, selected demolition methods, and demolition sequence including radiological controls, health and safety practices, and waste management requirements

A qualified, experienced demolition contractor will perform the demolition activities for Building 776/777, and a Colorado qualified structural engineer and certified safety professional will monitor demolition activities to ensure they are conducted safely The demolition contractor will prepare a Contractor Demolition Plan before initiating demolition activities The Contractor Demolition Plan will be prepared in accordance with Occupational Safety and Health Act, 29 CFR 1926, Subpart T, and will detail the methods to be used to demolish the facility

The demolition process will begin with the mobilization of the demolition contractor followed by demolition site preparation As part of demolition site preparation, existing features associated with Site utility systems will be located, marked, and evaluated for isolation purposes The sanitary sewer system will be isolated to prevent inflow of inappropriate wastewater generated by demolition dust control activities

Electrical power requirements will be identified as a part of the planning process Maintaining sump and foundation pumps for control of groundwater, power to sanitary sewer lift stations, and some area lighting may be necessary However, it is likely that power fed from the main distribution system will have been terminated and decommissioning activities will be supported by temporary power

Protective barriers or fences may be erected around permanent Site features designated to remain during demolition and ER Electrical distribution switch gear, overhead electrical distribution lines, area

lighting, groundwater monitoring wells, and fire protection system hydrants and post indicator valves that will remain operational during and/or after facility demolition will be protected, as required, and flagged for added operator awareness and overall visibility

As necessary, run-on and run-off controls will be implemented, temporary diversion berms, erosion control silt fencing, and interceptor ditches will be installed, and existing drainage culverts and ditches will be cleaned out as required to divert significant surface flow away from the demolition site The installation of run-on/run-off controls will be coordinated with Site Services and Environmental Management personnel responsible for the surface water monitoring system surrounding the demolition area Traffic patterns and loading areas will be established to facilitate waste management activities Final site grading will be determined and performed in consultation with ER

### 5 2 Demolition Hazards, Controls, and Monitoring

Demolition activities present hazards to workers and the environment Environmental impacts will be minimized through implementation of procedures designed to prevent uncontrolled release of waste, to control water run-on and run-off, and to minimize fugitive particulate emissions The environmental protection procedures will be detailed in the work packages Other hazards include radiological and industrial Hazard controls and monitoring during demolition are discussed in the following sections Table I-3 outlines the potential controls, depending on the status of the building, during demolition

#### 5 2 1 Air Emissions Control

In accordance with the Colorado Air Quality Control Commission Regulation 1, a Dust Control Plan will be prepared before initiation of demolition activities that will describe the specific methods to be used to control fugitive particulates during demolition activities Enhanced control methods will be used to keep fugitive emissions as low as reasonably achievable As appropriate for each activity, the following list provides typical methods to be used to suppress fugitive emissions

- A controlled water spray or fixative will be used to minimize fugitive particulate emissions without resulting in excess accumulation or run-off Depending on the work location, a water truck or hydrant may be used
- A flag or windsock will be used to assist workers in maintaining the optimal location while directing the water spray
- Amended water will be used in the event that standard dust control methods are not consistently effective
- Water spray nozzles may be mounted directly on demolition equipment arms to target the spray directly at the work area The spray velocity will be minimized to provide wetting without excessive runoff or aerosolization
- Facility debris will be loaded into approved waste containers These containers will be covered when unattended and/or not in use to control fugitive particulate emissions (typically overnight)
- Limitations on waste piles will be established to ensure that building rubble is containerized in a timely manner Fixatives or covers will be applied to waste piles when unattended and/or not in use to minimize dust (typically overnight)
- Roads may be periodically sprayed and/or cleaned
- Dust control devices or shrouds may be used on individual pieces of equipment
- Demolition work will be suspended when wind speeds exceed 30 mph, and work will be evaluated by a safety professional before proceeding Demolition work will be halted when sustained winds exceed 44 mph, in accordance with the Site OS&IH Program Manual



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## Table I-3
## Demolition Methodology

| Potential Demolition Situation | Potential Control | Control Documentation/Evaluation |
|---|---|---|
| Walls, floors, ceilings, or columns/joints have been decontaminated | • Work boundary, exclusion zones<br>• Personal protection equipment<br>• Water spray (remote or direct)<br>• Tailgate meetings and daily planning, involving engineering and health and safety personnel<br>• Wind restrictions | • Contractor Demolition Plan<br>  • Dust Control Plan<br>• RWPs<br>• Work packages<br>  • Job Hazard Analysis<br>• Health and Safety Plan<br>• Worker and work environment monitoring results<br>• Radiological ambient air monitoring program (RAAMP) results |
| Walls, floors, ceilings, or columns/joints have been removed | • No action required | • No action required |
| Walls, floors, ceilings, or columns/joints decontamination/removal was not feasible – encapsulants applied | • Work boundary, exclusion zones<br>• Personal protection equipment<br>• Water spray (remote or direct)<br>• Tailgate meetings and daily planning, involving engineering and health and safety personnel<br>• Wind restrictions<br>• Encapsulants<br>• Decreased wind restrictions<br>• Stockpile restrictions<br>• Amended water<br>• Fixatives/surfactants | • Contractor Demolition Plan<br>  • Dust Control Plan<br>• RWPs<br>• Work packages<br>  • Job Hazard Analysis<br>• Health and Safety Plan<br>• Worker and work environment monitoring results<br>• RAAMP Results |
| Walls, floors, ceilings, or columns/joints decontamination/removal are not feasible – encapsulants applied and the area was delineated with paint | • Work boundary, exclusion zones<br>• Personal protection equipment<br>• Water spray (remote or direct)<br>• Tailgate meetings and daily planning, involving engineering and health and safety personnel<br>• Wind restrictions<br>• Encapsulants<br>• Decreased wind restrictions<br>• Stockpile restrictions<br>• Amended water<br>• Fixatives/surfactants<br>• Specific controlled demolition procedure | • Contractor Demolition Plan<br>  • Dust Control Plan<br>  • Specific Procedure<br>• RWPs<br>• Work packages<br>  • Job Hazard Analysis<br>• Health and Safety Plan<br>• Worker and work environment monitoring results<br>• RAAMP Results |

Dust control measures will be applied and evaluated for effectiveness throughout the demolition activity Air monitoring of potential project emissions, which is not a control, but a means of assessing control effectiveness is documented in Section 6 1

### 5.2 2 Radiological Protection and Control

Radiological controls and monitoring during demolition will be performed in accordance with the DOE approved Site Radiation Protection Program (RPP), RPP-0001, Revision 3 The Site RPP is implemented through the Site Radiological Control Manual, MAN-102-SRCM, Revision 1 and the Radiological Safety Practices Manual, which implement the requirements of 10 CFR Part 835 These requirements and implementing documents are focused on occupational (worker) exposure and protection and are based on the process of maintaining worker exposure to ALARA Section 6 1 of this modification addresses air monitoring and standards for emissions and public health and environment protection Enhanced radiological controls will be applied for outside work, as applicable, such as continuously evaluating wind direction impact on air monitoring locations

Full-time Radiological Control Technician support will be used during demolition activities to ensure the radiological controls are consistently implemented to minimize the dose to individuals, the environment and the public from exposure to DOE-added radioactive materials

Engineering controls will be utilized during demolition activities in accordance with the controls specified in the Air Emissions Control section above Measures will be taken to minimize the dose to individuals by a combination of fixatives, encapsulants, and the use of administrative controls

Contamination and airborne radioactivity surveys will be performed as necessary to document and detect changes in the radiological conditions in the work area These surveys will be used to ensure the adequacy and effectiveness of engineering controls in containing radioactive material and minimizing dose In addition to the Site sampling network discussed in Section 6 1, project-specific air samples will be collected and evaluated as quickly as practicable using the appropriate site approved counting techniques and equipment

The specific radiological controls and monitoring requirements that will be used during demolition activities, including waste container loading, will be identified in the RWP for the applicable task(s) being performed The RWP controls will be evaluated against the adequacy and effectiveness of engineering controls and may be upgraded or downgraded as appropriate during the course of demolition activities

Once the building decontamination and characterization are complete, a final air dispersion model run will be used to develop the final work area boundaries and worker protection requirements The immediate and collocated work area requirements and personal protective equipment (PPE) will be based on the regulatory protection factors for determining airborne postings and personnel protection requirements The work area boundaries and PPE will initially be based on the final model run and conservative assumptions Once work area sampling results become available, these controls may be modified, as necessary, throughout the demolition

### 5.2.3 Industrial Hazards and Controls

The demolition contractor will be required to cover industrial hazards and controls in the Contractor Demolition Plan and in the Job Hazard Analysis A Colorado qualified structural engineer and certified safety professional will monitor demolition activities to ensure they are conducted safely Industrial Hygiene will conduct monitoring as necessary for both chemical hazards (e g dust, silica, metals, and gases) and physical hazards (e g noise, heat, and cold) Engineering and administrative controls will be used to mitigate the potential hazards to workers and the environment

The selected demolition alternative was chosen in part because it minimizes industrial hazards relative to the other alternatives evaluated Demolition will be conducted using heavy industrial equipment, and personnel will not be working inside the structure during demolition

## 6.0 Environmental Protection and Monitoring

The ARARs and National Environmental Policy Act values presented in Sections 7 and 8 of the DOP have been reviewed relative to building demolition, and have been amended as necessary to address demolition through a minor modification to the DOP The following sections discuss other environmental considerations and requirements for demolition

### 6 1 Site Air Monitoring

Environmental air monitoring will be performed in accordance with the requirements of the Site Integrated Monitoring Plan (IMP) The existing RAAMP sampler network will be used for ambient air monitoring during removal activities The RAAMP sampler network continuously monitors airborne dispersion of radioactive materials from the Site into the surrounding environment Thirty-eight samplers comprise the RAAMP network Fourteen of these samplers are deployed at the Site perimeter and are used to confirm Site compliance with the 10 mrem dose standard mandated in 40 CFR Part 61, Subpart H, these samplers will be used to confirm that demolition has contributed less than 0 1 mrem of dose potential to public receptors Filters from the 14 perimeter RAAMP samplers are collected and analyzed monthly for uranium, plutonium, and americium isotopes Results of compliance sampling at the Site perimeter are compiled, communicated to project management as soon as practical following laboratory analysis, and presented in the Quarterly Environmental Monitoring Reports and the Radionuclide Air Emissions Annual Report

In addition to the perimeter network, performance monitoring (PM-Rad) will be carried out during demolition and removal activities using ten existing RAAMP samplers arrayed around the Site's Industrial Area PM-Rad characterizes potential short-term emissions from the project on ambient air quality and receptors closer to the projects than the Site perimeter by quantifying gross alpha activity on filters Gross alpha analysis can be performed in a much shorter time frame (days versus weeks) than is necessary for isotopic analysis

Beginning at least one week before the start of demolition, PM-Rad sampling will begin on a weekly filter exchange schedule In accordance with the IMP, filters will be collected weekly and screened for long-lived alpha contamination and/or gamma emissions Results of the radiation screening will be available about four workdays after submitting filters to the laboratory The results will be used to calculate the airborne concentration in units of activity per volume of air drawn through the filter ($pCi/m^3$) These results will then be compared to two predefined Action Levels, based on the expected isotopic composition of materials to be disturbed Action Level 1 will correspond to a 1 0 mrem/yr off-site dose rate, and Action Level 2 will correspond to a 5 0 mrem dose rate, based on the assumption that the hypothetical receptor has been exposed to the alpha concentration measured at the PM-Rad sampler and that the exposure lasted for two weeks (one week of sample collection, one week for analysis) All alpha activity is assumed to derive from Pu-239 for the purpose of determining whether Action Levels have been exceeded, until isotopic results prove otherwise, this approach provides conservatism

For radionuclide concentrations below Action Level 1, PM-Rad will continue with weekly filters being screened for radioactivity If Action Level 1 is exceeded, affected weekly filters from the area-specific samplers will be submitted for isotopic analysis on an expedited schedule Site environmental personnel will meet with project personnel to evaluate the project for unexpected conditions and to determine what additional sample collection and analysis may be warranted Site environmental personnel will contact project personnel within six hours of receiving results if Action Level 2 is exceeded, and will meet with project personnel to reassess project parameters and evaluate measures to mitigate future emissions



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Mitigating measures may include additional dust control efforts, modifications to demolition techniques, reevaluation of work response to environmental conditions (e g , high wind), and cessation of work When sample isotopic results exceeding Action Level 2 also indicate that a 10 mrem dose to the most impacted public receptor could occur (based on the indicated concentration remaining constant for one year), project operations will cease until appropriate controls are in place Results of performance monitoring will be communicated to project management as soon as practicable following laboratory analysis, and will be summarized in the Quarterly Environmental Monitoring Reports

### 6 2 Soil Disturbance Permit

Before the demolition of any building within the Building 776/777 Closure Project, the demolition contractor will complete a Soil Disturbance Evaluation Form The contractor will identify the location of underground utilities (i e , sewer, process waste, storm drain, telephone, water, fuel, and electric lines), as well as any known environmental, waste, radiological, and/or safety hazards When completed, a Site excavation specialist, who will coordinate the review and approval of the demolition work with the appropriate organizations, will review the Soil Disturbance Evaluation Form Soil disturbance activities will not be performed until the excavation specialist has provided written approval for the work to proceed [4]

### 6 3 Demolition Notification

Prior to the demolition of any building or portion of a building within the Building 776/777 Closure Project, the demolition contractor will prepare and submit a Demolition Notification to CDPHE for review and approval in accordance with CAQCC Regulation No 8, Part B Demolition activities will not be performed for that portion until CDPHE has provided written approval for the work to proceed

### 6.4 Migratory Bird Clearance

Before the demolition of any building within the Building 776/777 Closure Project, a survey will be conducted to ensure the planned demolition activities will not impact migratory birds or their nests This inspection is for nesting birds in and around facilities prepared for demolition The Building 776/777 project will comply with the substantive portions of the Migratory Bird Treaty Act, which can include establishment of alternative nesting habitats away from building demolition

### 6 5 Surface Water Management

During facility demolition, surface water run on/run off will be controlled using standard construction methods, including silt fences, hay bales, and diversion ditches per the Site Storm Water Pollution Prevention Plan[5] Water from dust control and/or cutting activities will be managed as incidental waters in accordance with the Site National Pollutant Discharge Elimination System (NPDES) Permit[6] and procedure for the control and disposition of incidental waters [7] Surface water monitoring will be conducted in accordance with the Site IMP Additional performance monitoring stations will be installed, as necessary, based on activity-specific assessments performed by Site water quality Subject Matter Experts Enhanced controls may be implemented in the immediate work area where demolition is occurring to prevent release of dust control water

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[4] Soil disturbance requirements are contained in Chapter 45 of the RFETS OS&IH Program Manual, entitled "Excavation and Trenching "

[5] *RFETS Storm Water Pollution Prevention Plan* (Rev 1), April 2003

[6] NPDES Permit No CO-0001333, October 2000

[7] Control and Disposition of Incidental Waters (1-C91-EPR-SW 01), (latest revision)

## 6 6 Groundwater Management

The Sampling and Analysis Plan (SAP) for the D&D Groundwater Monitoring of Buildings 707, 776/6777, 371/374, 865, and 883[8] describes the well installation, well development, and initial groundwater sampling activities planned for the Building 776/777 Closure Project during decommissioning

The levels of contamination in groundwater surrounding and beneath the footprint of the Building 776/777 Closure Project vary significantly among the sample points The principal region of higher levels of groundwater contamination in this area is known as the "Industrial Area (IA) Plume "[9] The IA Plume is believed to result from contamination migrating from multiple Individual Hazardous Substance Sites (IHSSs) Its principal constituents are three volatile organic compounds (VOCs) trichloroethene, tetrachloroethene, and carbon tetrachloride IHSS 118 1, located immediately north of the building, is the likely source of carbon tetrachloride contamination that exceeds RFCA Tier I Action Levels in groundwater at the northwest portion of the building Sources of the IA plume are not well known, and the effort to determine the sources is underway[10]

In the event groundwater is encountered during facility demolition, it will be removed, as necessary to characterize and remediate the interior surfaces of the building, specifically the basement, sumps and buried equipment pits Samples will be collected as necessary to determine the disposition pathway for the pumped groundwater If the water is contaminated, but there is no threat to surface water protection standards, the groundwater may be left in the subsurface structure with controls sufficient to protect the health and safety of workers and the public until remediation during ER If the water is contaminated and is a threat to surface water protection standards, the water will be pumped to a treatment facility until remediated during ER Project-specific controls will be detailed in the Contractor Demolition Plan and work package(s) for the demolition activity

## 7.0 Transition to Environmental Restoration

Demolition activities performed within the scope of the Building 776/777 DOP will be coordinated with activities performed within the scope of the ER RSOP or other ER decision document The goal is to achieve an integrated process that minimizes risk to workers and the environment, minimizes the generation of remediation wastes, streamlines technical processes, and reduces Building 776/777 Closure Project costs During decommissioning

- Electrical and water lines will be removed Underground water lines located outside the facility footprint will be plugged or capped A map showing the locations and sources of these utility lines will be maintained in the Building 776/777 Closure Project files and provided to the ER Program
- Process waste lines, tanks, and other lines associated with the process waste transfer system (i e , the "new" process waste lines) and any "old" process waste lines within the facility will be removed and/or isolated at the facility perimeter A map, showing the locations and sources of the process waste lines will be maintained in the Building 776/777 Closure Project Files and provided to the ER Program
- The Building 730 underground plenum deluge tanks will be emptied of liquids and sludges, and contamination will be fixed Mechanical and electrical equipment in Building 730 will be

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[8] Sampling and Analysis Plan (SAP) for the D&D Groundwater Monitoring of Buildings 707, 776/777, 371/374, 865, and 883 (latest revision)

[9] Integrated Monitoring Plan Background Document, FY 2000, September 1999, and the 1999 Annual RFCA Groundwater Monitoring Report, Figure 8-1, Monitoring Well Locations, East Industrial Area VOC Plume

[10] Sampling and Analysis Plan for Groundwater Monitoring of Industrial Area Plume, Rev 1, 01-RF-00907, PADC-2001-00576



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removed Two underground process waste tanks in Building 730 were cleaned and filled with foam in 1996[11] These tanks will be handed off to ER following completion of these activities

- Sanitary sewer lines, tanks, and ancillary equipment will be flushed with clean water and capped or removed to the nearest isolation valve
- Structural material within three feet of the final grade will be removed, including building slabs and foundations
- Structures below three feet of the final grade will be characterized and removed if necessary per site requirements

In the event there is a gap between decommissioning and remediation activities, the Site Services Project will be responsible for interim surveillance and maintenance activities The hand-off from decommissioning to the landlord organization will be documented in writing, by the Decommissioning Project, RISS Project, and ER Program

Before making the decision to leave any unrestricted-release slabs in place, Building 776/777 project management will coordinate with ER on their soil sampling and remediation plans ER will characterize and remediate as necessary the soils under the building and associated with exterior IHSSs and potential areas of concern (PACs), following the established RFCA soil action levels Remediation of the under building contamination is expected to follow slab removal Therefore, the Building 776/777 project is not planning for backfill ER will also characterize (and remove if necessary) the process waste lines beneath the floor slabs and the underground tanks and pipelines outside the footprint of the building per the ER RSOP

[11] Completion Report for the Underground Storage Tanks Source Removal Project, RF/ER-96-0050, September 23, 1996



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